Cultural Dynamics and the Ritual Role of Woods in Pre-Contact Hawai'i

MICHAEL J. KOLB AND GAIL M. MURAKAMI

PALAEOETHNOBOTANY has been an important component of archaeological research since its florescence more than two decades ago. It has been used to address important anthropological issues including ancient diet and resource use, the development of agriculture, palaeoenvironmental reconstruction, and cultural interaction and exchange systems. The identification of macrobotanical wood charcoal specimens is one of these techniques, and as a class of archaeological data, wood charcoal possesses a number of advantages over other plant palaeoecological data for archaeologists interested in addressing questions about social and ideological change. It is usually found in abundance in archaeological contexts, preserves well in most environments, and is durable through a variety of depositional and diagenetic processes. Although wood charcoal identification has primarily been used as a technique for palaeoenvironmental reconstruction, it is also ideal for the study of cultural dynamics because material culture reflects people's choices in a number of cultural pathways, including domestic practices, ideology, and ritualization, as well as political relationships. Inquiries into the changing use of plants can be particularly informative in understanding political and ideological aspects of a society because variability in the economic importance of a plant often parallels variability in its cultural significance as well (Cowan 1985:243; Ford 1979:320–323; Hastorf 1988; Hastorf and Johannessen 1993).

Woods as well as other plant parts are imbued with significant cultural properties and possess a variety of constituent ritual uses in societies around the world. In a recent treatise, Hastorf and Johannessen (1993) identified three levels of social transformations through which plants are ritualized: cultivation, preparation, and consumption, any combination of which can lead to the "enculturation" of wild plants. Cultivation is the process in which a plant is routinely tended or harvested, whereby human agency and the act of cultivation transforms a plant from a natural or "wild" object to a cultural one. Repeated and intentional selection for aesthetic or functional traits eventually leads to physical alteration of a cultivar, infusing a plant with additional cultural value because now it is domes-

Michael J. Kolb is an archaeologist with the State Historic Preservation Division, Department of Land and Natural Resources, Honolulu, Hawai'i. Gail M. Murakami is a research associate at International Archaeological Research Institute, Inc., Honolulu, Hawai'i.

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ticated and needs constant human attention. The second transformation occurs when human preparation alters a plant into a culturally valued object. For example, Amazonian manioc is a plant inherently linked with symbolic structures and ritual cycles in modern Pirá-Paraná society, and the preparation of manioc enculturates it within human society so that it possesses ritual value for those who eat it during social and religious events (Hugh-Jones 1978). The process of brewing maize beer among Andean societies provides it with cultural value by converting it into an intoxicating form (Hastorf and Johannessen 1993). Again by altering the appearance, consistency, or form a plant is transformed into a culturally potent item. The third transformation is the act of consumption (for a food item this means consuming or eating the food). Certain food items such as intoxicating beverages (cf. Wagner 1978:240–241) are important during social, ceremonial, and religious transactions because they articulate these transactions as they are consumed. Consumption enhances the status of a food item because of its unique social role. Another potent means of consuming food is ritual or sacrificial burning. Among the ancient Phoenicians and Hebrews, using fire to burn or broil offerings corresponded to their notion of a god being a subtle entity, whose ethereal quality required proper nourishment through the fragrant smoke from a burnt offering (Smith 1969:371). Cooking with fire is spiritually purifying, giving a plant or animal an ethereal quality by which the gods could imbibe and receive their offering. Thus all three transformations are human actions that either physically or metaphorically alter or infuse a wild or natural plant with social value to make it a product of culture rather than a product of nature.

Woods can also be transformed into cultural products used in a variety of social contexts including ritual practice and therefore have excellent potential for informing us about the interplay between the cultural and biological environments. In many cultures wood was and is a primary material for manufacturing prestige items or used in ritual contexts. For example, logs used for sacrificial fires among the Inka were elaborately carved and decorated to transform them into objects of respect worthy for sacrificial offering (Polo de Ondegardo [1567] as cited in Hastorf and Johannessen 1993:121). In the Hawaiian Archipelago, woods possessed significant cultural value because of the isolated and fragile nature of its environment. A variety of woods were carved into anthropomorphic shapes and served as god images upon temples (Apple 1971:Table 1) or were ritually burned for their aromatic qualities. The growth and harvesting of certain woods was protected by religious sanctions. Moreover, traditional culture relied heavily upon materials such as woods for the manufacturing of material products necessary for daily life as well as prestige objects. A number of culturally valuable woods, as well as other plant cultivars and domestic animals, were transported with colonizing vessels because newly discovered island groups lacked many of the flora and fauna necessary for humans to survive. It is for these reasons that wood charcoal is an important source of information for some aspects of ancient Hawaiian society. The diversity and quantity of charcoal assemblages help us understand the nature of botanical exploitation strategies, practices that would otherwise be ephemeral because of the perishable nature of Hawaiian material culture.

In the following study, we examine variation in the use of woods from two traditional Hawaiian religious sites, variations that actively express cultural transformation of wood items and therefore are indicative of cultural values as well as cultural change. We do this by examining a charcoal assemblage collected from two religious temples, or *heiau* (both the singular and plural usage), from the island of Maui. This assemblage should not only provide information about the surrounding vegetation and environment, but also undoubtedly reflect certain cultural transformations of wood selected for ceremonial purposes. By examining variation in the utilization of wood charcoal, we can obtain a more precise sense of cultural changes and then suggest any accompanying cultural or environmental shifts that may have occurred in the past. We also rely on a rich ethnohistoric context to augment our interpretations about past social and ideological pathways of Hawaiian plant use, and simple methodological and statistical techniques that help tease apart aspects of spatial and temporal variation of ritual wood use. We propose that woods are not only useful to study patterns of environmental change in pre-Contact Hawai'i, but also to examine the transformation of material products into highly valued cultural items through their ritual use.

THE SITES AND THEIR SURROUNDING ENVIRONMENT

The Haleki'i and Pihana temple complex (State Inventory of Historic Places Site 50-50-04-592) consists of two archaeological sites located along the northern central coast of Maui in the district and community of Wailuku (Fig. 1). Haleki'i and Pihana served as a pair of religious temples until their abandonment in A.D. 1819, when the Hawaiian system of social sanctions (*kapu*) was abolished.

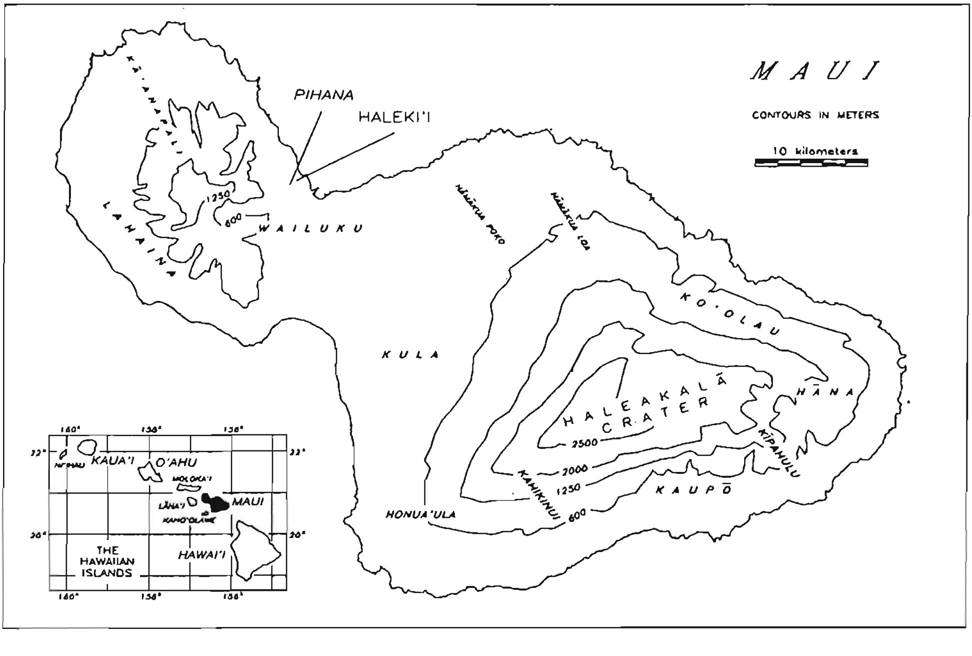

Fig. 1. Location of Haleki'i and Pihana temples in the district of Wailuku, on the island of Maui, Hawai'i.

All that remains of the sites are their rectangular stone foundations constructed of basalt lava. Most temple foundations are rectangular, walled enclosures or platforms paved with small stones, which once contained altars, wooden images, and thatched structures of varied functions. Both foundations now contain only the remains of a number of internal features, including depressions, pits, walls, and small enclosures.

Haleki'i and Pihana are situated on a lithified sand dune ridge on the west side of 'Īao Stream, high above the mouth of the stream and the Wailuku plains, approximately 300 m inland of the coast and overlooking the surrounding area (Fig. 2). They are located on the same north-south ridge, Haleki'i being approximately 125 m north of Pihana. Terrain in the immediate vicinity is characterized by uneven sand dune to the south and west and the stream bed to the east. The site is about 20 m above the present stream bed, covering 4.13 ha, and offers an extraordinary view of the surrounding area. The climate of Wailuku is dry despite its windward location. Annual rainfall averages 46 cm along the coast (Stearns and Macdonald 1942:36), although plenty of fresh water is available from the amphitheater valley of 'Īao, which originates in the frequently cloud-covered West Maui mountains. The vegetation around the complex traditionally consisted of arid dryland and coastal vegetation, including xerophytic shrubs and stands of coastal trees (Carlquist 1970).

Wailuku was a major political district under the jurisdiction of the West Maui chiefs, and the temples of Haleki'i and Pihana represented the traditional ruling

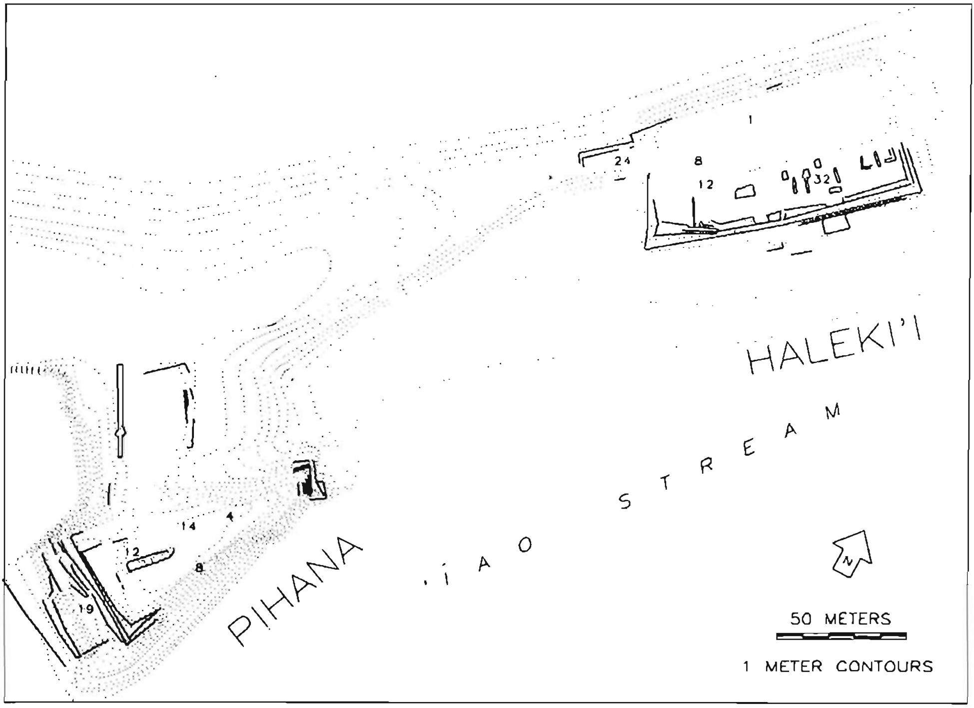

Fig. 2. Site map of Haleki'i and Pihana temples. Numbers represent the locations of each excavated feature discussed in the text.

center of Maui and home to one of the most important paramount chiefly lineages in Hawai'i. The temples were centered around a series of villages, extending from the coast to the mouth of the 'Īao Valley. Wetland agricultural field systems were continuous (or near continuous) along 'Īao Stream, which provided ample water for growing wetland *Colocasia esculenta* (*kalo* or taro), the primary staple crop of the area.

The name Haleki'i means "house of images." The temple served as a chiefly residence and contained a suite of residential structures and family shrines presumably "guarded by images." Some of the highest-status chiefly families resided here; the high chiefess Keopuolani was born here. She was a descendant of the paramount lines of both Maui and Hawai'i and was the wife of Kamehameha I, monarch of the archipelago, and mother of Liholiho (Kamehameha II). The literal translation of Pihana is "fullness," though some local residents believe the correct name is Pi'ihanakalani, meaning "ascending into heaven." Pihana served as the premiere war temple of Maui and the gathering place of the kings.

Excavations were undertaken at Haleki'i and Pihana in 1989 under the aegis of the *Na Heiau O Maui* interdisciplinary research program. The primary goals of this research program are to articulate the nature and trends of change of complex society in pre-Contact Hawai'i by examining the architecture and function of *heiau* temples using archaeological data in conjunction with historical and ethnographic archival research (Kolb 1991, 1992, 1994*a*, 1994*b*; Schoenfelder 1992).

The research scope called for excavating 99.5 m^2 (a 1 percent area sample) to examine the complex's architecture, building chronology, and function. Excavated surface areas were chosen by random and judgmental procedures (see Kolb 1991:23–25 for a full discussion of sampling) and focused on identifying features and earlier structural components to articulate the complex's function, rate of growth, and methods of construction, and also to obtain charcoal for radiocarbon dating and identification. Excavations resulted in the identification of seven major building episodes, two at Haleki'i and five at Pihana. Pihana is the older of the two sites, with a series of architectural structures beneath the present site dating to c. A.D. 1030–1290, 1270–1460, 1440–1650, and the two most recent episodes, c. A.D. 1650–1820 (Kolb 1991:212–223). The two episodes at Haleki'i date to c. A.D. 1316–1640 and A.D. 1640–1820. A variety of activities were undertaken at both sites, including domestic cooking, artifact manufacturing, the consecration of sacrificial offerings, and ritual roasting and feasting upon domestic pigs and other animals, as well as general burning characteristic of bonfires or torches. During the course of excavation ten distinct features utilized for wood burning were identified, five from each site. Each of these features is described in Table 1. Eight features were radiocarbon dated with available charcoal; the remaining two were dated by stratigraphic relationships.

Figure 2 shows the locations of each feature. Four were stone-lined firepits located on top of Haleki'i (Haleki'i 1, Haleki'i 8, Haleki'i 12, and Haleki'i 32) and used primarily for the preparation of foodstuffs for consumption. One of these firepits, Haleki'i 8, was circular but only 36 cm in diameter, the smallest firepit in the sample. A number of *Aleurites moluccana* (*kukui* or candlenut) nutshell fragments were also associated with this smaller firepit. The last feature on Haleki'i was Haleki'i 24, a hearth area located on an auxiliary terrace to the south of Haleki'i's main platform. It also was associated with domestic debris as well as

TABLE 1. ARCHAEOLOGICAL FEATURES FROM HALEKI'I AND PIHANA TEMPLES WITH KNOWN CONTEXTUAL FUNCTION AND STRATIGRAPHIC RELATIONSHIPS

FEATURE	ARCHAEOLOGICAL CONTEXT	AGE (A.D.)	WOOD TAXA	CHARCOAL WEIGHT
Haleki'i 1	Stone-lined firepit, domestic	1650–1820	4	2.3
Haleki'i 8	Stone-lined firepit, domestic	1650–1820	2	0.4
Haleki'i 12	Stone-lined firepit, domestic	1440–1650	4	3.4
Haleki'i 24	Hearth, domestic, manufacturing	1440–1650	6	7.6
Haleki'i 32	Stone-lined firepit, domestic	1650–1820	3	10.4
Pihana 4	Stone-lined firepit, ritual feasting	1650–1820	1	6.6
Pihana 8	Bonfire, ritual feasting	1650–1820	3	9.2
Pihana 12	Bonfire, ritual feasting	1650–1820	4	4.8
Pihana 14	Bonfire, unknown	1650–1820	7	2.3
Pihana 19	Hearth, domestic, manufacturng	1440–1650	11	5.0

with stone debris from the manufacturing of material implements. On Pihana, two features (Pihana 8 and Pihana 12) were indistinct hearth areas associated with large quantities of charcoal and burned domestic pig bone (*Sus scrofa*), presumably a result of bonfires used in the "scorching" or broiling of ritual offerings for sacrifice and feasting. Pihana 4 was used for a similar purpose, but is stone-lined. A fourth feature, Pihana 19, was similar to Haleki'i 24 in morphology, function, and location. It is stone-lined, located off the main platform on a south auxiliary terrace. It too was associated with both food preparation and stone manufacturing debris. Pihana 14 represents the final feature. It was similar in morphology to Pihana 8 and Pihana 12, being an indistinct area of unconfined surface burn, but unlike these other hearths lacked any kind of material debris. The best explanation is that of a relatively contained bonfire of unknown function; it presumably served some ritual function because of its location within Pihana's sanctum.

METHODS

Archaeologists using palaeoethnobotanical data must work with the liability that they cannot completely sample the original plant community in which they are interested to affect environmental and social reconstructions of the past. They must therefore rely on less-direct sampling techniques and statistical examinations. Because Haleki'i and Pihana served as religious sites of some importance, a wide range of activities was undertaken there. As well as the performance of important religious and political ceremonies, domestic and prestige goods manufacturing activities were also integral components of high-status residence. Such a wide range of activities resulted in a very high proclivity for burning. Burning wood was used for domestic cooking, processing and tempering material artifacts, bonfires presumably for signaling or for light, as well as for consuming or scorching sacrificial offerings. Ritual activities were also sporadically performed, so temples required periodic repair and cleaning, in which organic debris was most likely burned (Apple 1971:31–32). Although charcoal was collected from almost all excavation contexts, charcoal identification procedures were restricted to analyzing a single charcoal sample for each of the aforementioned archaeological features. These features provide excellent functional, spatial, and temporal control for each charcoal sample, allowing us to adequately evaluate wood use with the site's proper functional context. Identified charcoal was collected only from the dense concentration of charcoal directly inside and at the bottom or base of each feature.

Charcoal data are presented as the total weight in grams for each identified taxon. Total weight is the most common quantification used in Hawai'i to represent charcoal data and examine assemblage variability and is utilized here. Total weight provides a number of advantages over specimen counts, which are susceptible to quantification bias caused by various rates of charcoal friability for different taxa, differential preservation of wood taxa, and data recovery techniques that tend to focus on the recovery of larger specimens or result in further specimen breakage (Greenlee 1992; Miller 1985). Total weight, however, is not immune to potential quantification biases (Asch and Asch 1975; Miller 1985, 1988; Rossen and Olson 1985). A number of variables are known to alter total weight values and can result in sampling bias that misrepresents a given taxon's population size or archaeological context. They include the differential density of wood among taxonomic groups, variability in burning techniques, differential preservation of taxa during the carbonization process, and postdepositional mineral or clay encrustations. Similar to total weight, there are a series of variables that alter specimen counts. When total weights are compared spatially or temporally between archaeological units, they are standardized to facilitate comparison (Miller 1988; Pearsall 1989). A ratio is used to convert raw weights to the total weight recovered per 10,000 cm^3 (0.1 m^3), the volume of arbitrary excavation levels.

Another potential bias is the effects of sample size on taxa diversity. The larger the sample size, the greater the probability of identifying rare species. Rare taxa may be identified in small data sets, but can be regularly present when the sample reaches a certain minimal size level. Although the absence of rare species in smaller data sets does not dramatically alter analysis of resource utilization patterns, they are important for other types of analysis such as ecological reconstruction (e.g., Graves and Murakami 1993; Miller 1985; Murakami et al. 1992; Rossen and Olson 1985). Proper recovery and sampling techniques, however, can help neutralize the adverse effects of sample size on taxa diversity. It is for this reason that sampling procedures relied on a random sample of specimen counts rather than on selection using overall weight; this allowed the entire range of specimen sizes to be selected. Twenty-five percent of all collected specimens (33–54 percent by total weight) were macrobotanically identified. Samples were randomly chosen by the number of specimens; the remaining charcoal was either sent for radiocarbon analysis or stored for later use. Charcoal was sampled by specimen count rather than total weight to examine the entire size range of charcoal specimens, thereby alleviating some of the potential biases caused by weight-specific depositional or diagenetic processes. The exception was the sample collected from Haleki'i 8, where 100 percent of the sample was analyzed because of its small size. Figure 3 shows the relationship between total weight of the samples and the number of identified taxa, and reveals that sample size is not linearly correlated with taxa richness.

A total of 275 charcoal specimens was examined, totaling 53.6 g in weight. Specimens for identification were sorted into taxonomic groups using the anatomical features seen in the freshly fractured transverse facets. All sorting was

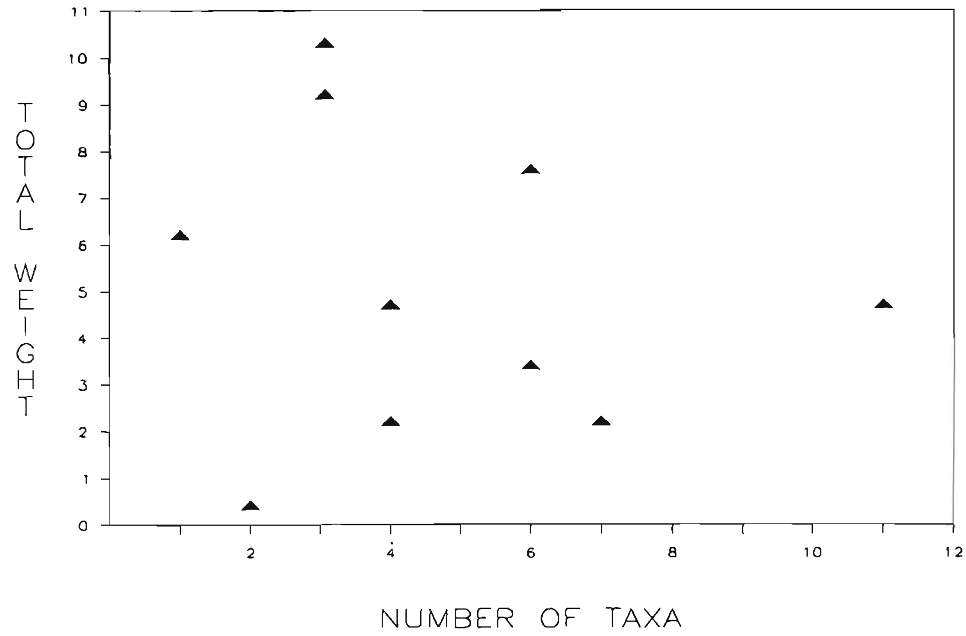

Fig. 3. Scatter plot showing the relationship between total weight of charcoal samples and number of identified taxa for each feature.

accomplished with the aid of a dissecting microscope (American Optical Stereoscan) with a maximum magnification of 40 ×. Representative charcoal pieces selected from these numbered groups were carefully shaved with razor blades to expose the three facets necessary for identification. The faced pieces were slowly infiltrated with Spurr's epoxy resin (Spurr 1969) in a procedure modified from Smith and Gannon (1973) and polymerized in size 00 embedding capsules used in electron microscopy. After polymerization the resin-embedded charcoal pieces were sectioned with a steel microtome knife on a Reichert sliding microtome. The thin sections of the transverse, radial, and tangential facets of the charcoal were permanently mounted on microscope slides. These slides were incorporated into the Archaeological Wood Collection at the Department of Botany, University of Hawai'i at Mānoa.

Identifications were made by comparing the thin sections of the charcoal with those of known woods from the Pacific Island Woods Collection and with written descriptions of Hawaiian or exotic woody genera (e.g., Lamberton 1955 or Metcalfe and Chalk 1950). The wood collection is part of a study on the anatomy of Hawaiian and Pacific woody genera at the Department of Botany, University of Hawai'i at Mānoa, which also provided the facilities for processing the charcoal.

THE CHARCOAL ASSEMBLAGE

Table 2 lists the charcoal assemblage by identified and unidentified taxa. A total of 16 plant taxa was identified by distinct anatomical characteristics seen in the

TABLE 2. WOODY TAXA IDENTIFIED IN THE CHARCOAL ASSEMBLAGE COLLECTED FROM HALEKI'I AND PIHANA WITH COMMON NAME, TRADITIONAL USE, AND ENVIRONMENTAL CONTEXT

	HAWAIIAN TRADITIONAL			
TAXA	NAME	USE	HABITAT	FORM
Acacia koaia	*Koai'a*	Domestic, artifacts	Dry	Tree
Chamaesyce spp.	*'Akoko*	Domestic, firewood	Dry	Shrub
Cheirodendron trigynum	*'Ōlapa*	Domestic, artifacts/dye	Mesic	Tree
Chenopodium oahuense	*'Āheahea*	?	Dry	Shrub
Diospyros sandwicensis	*Lama*	Ritual, houses	Dry	Shrub
Dodonaea viscosa	*'A'ali'i*	Domestic, *lei* making	Dry	Shrub
Fern caudex	—	Domestic, ritual	—	—
Ilex anomala	*Kāwa'u*	Domestic, canoes, artifacts	Mesic	Tree
Metrosideros polymorpha	*'Ōhi'a lehua*	Ritual, idols and temples	Dry	Tree
Myoporum sandwicense	*Naio*	Domestic, houses	Dry	Tree
Sida fallax	*'Ilima*	Domestic, *lei*, house thatch	Dry	Shrub
Sophora chrysophylla	*Māmane*	Domestic, house	Mesic	Tree
Styphelia tameiameiae	*Pūkiawe*	Ritual, burning	Dry	Shrub
Syzygium malaccense	*'Ōhi'a 'ai*	Ritual, temple houses	Mesic	Tree
Unknown A	—	—	—	—
Unknown B	—	—	—	—

thin sections. Two taxa, although morphologically distinct, remain unidentified. Taxonomy and nomenclature used for the known taxa are those of Wagner et al. (1990). All the identified woods were used as firewood; however, it is worthwhile to categorize the assemblage in a number of other ways, such as habitat, wood morphology, and the traditional use and cultural context in which these woods were exploited. Two general categories of traditional use are evident: wood used for domestic purposes such as general wood burning or the manufacture of domestic implements and wood that possessed ritual value because of some special characteristic such as a by-product (seed or flower), wood hardness, or aromatic quality.

Nine taxa served primarily for domestic use, including *Ilex anomala*, *Cheirodendron trigynum*, *Chenopodium oahuense*, *Chamaesyce* spp., *Acacia koaia*, *Sophora chrysophylla*, *Sida fallax*, *Myoporum sandwicense*, and *Dodonaea viscosa*.

Ilex (*kāwa'u*) is a tree indigenous to Hawai'i, commonly 5–12 m tall, which inhabits the mesic to wet forest at 600 to 1400 m elevation on all the main islands except Ni'ihau and Kaho'olawe (Wagner et al. 1990:222). The soft white wood of *Ilex* was used for canoe timber and anvils for the pounding of bark cloth (Buck 1957:180; Malo 1951:21). *Cheirodendron* (*'ōlapa*) is an endemic tree that stands 5–15 m tall in mesic to wet forests of all the main islands except Kaho'olawe (Wagner et al. 1990:227–228). Spears used in bird liming or bird snaring were said to have been made from *Cheirodendron* wood (Malo 1951:21). A blue dye for bark cloth was made from its fruit, leaves, and bark (Wagner et al. 1990:228). *Chenopodium* (*'āheahea*) is an endemic shrub common to the coastal lowlands but may become arborescent at higher elevations (Hillebrand 1888:380). The traditional use of its soft wood is unknown; however, we do know that the leaves were cooked and eaten as greens (Hillebrand 1888:380; Malo 1951:23). The endemic members of the genus *Chamaesyce* (*'akoko*) consist of 15 species, which may be found in coastal to wet forests as shrubs to small trees (Wagner et al. 1990:604–617). Hillebrand (1888:346) believed that *Chamaesyce* was valued for firewood, and its milky sap was once considered a possible source for rubber (Rock 1913:261).

Acacia koaia (*koai'a*) is another species used for domestic purposes. This small tree is a miniature version of *Acacia koa* A. Gray, complete with sickle-shaped phyllodes. Although noting differences in morphology and wood hardness, Wagner et al. (1990:641–642), in the *Manual of the Flowering Plants of Hawai'i*, considered that *A. koaia* may be a variation of *A. koa*. However, enough differences distinguish the two taxa. The hard *A. koaia* wood was used for making spears, fancy paddles, bark cloth beaters (Pukui and Elbert 1986:157), house timber, and shark hooks (Malo 1951:21), although its cousin *A. koa* was used to construct canoes (Hillebrand 1888:112). Shrubs or trees of the endemic *Sophora* (*māmane*) are up to 15 m tall and inhabit a broad ecological range, including dry shrubland and forest to mesic or rarely wet forest and alpine forests (Wagner et al. 1990:706). Its hard wood was used for house posts (Buck 1957:83), sled runners used in the *hōlua* game, and agricultural digging spades (Malo 1951:21).

Sida (*'ilima*) is an extremely common dryland shrub and served a variety of domestic uses. This indigenous shrub was planted in the past as it is today near houses to provide flowers for *lei* making. It grows in the wild from coastal environments to mesic forests (Neal 1965:552). The erect stems of *Sida* were tied to the frame of sleeping houses, upon which grass was lashed. Whole *Sida* bushes tied together were also used to secure mounds of *kalo* (*Colocasia esculenta*) plantings in swampy areas. The prostrate coastal *Sida* was used as floor coverings under mats (Handy and Handy 1972:228). The roots and flowers were used medicinally (Neal 1965:552–553). *Myoporum* (*naio*) is an indigenous tree that ranges in habit from shrubs in coastal areas to 5 m trees at higher elevations (Wagner et al. 1990:928–929). The fragrant wood of *Myoporum* was used as house posts (Apple 1971:63; Buck 1957:83) and substituted for sandalwood (*Santalum* spp.) in trade with China when the supply of native sandalwood became low (Rock 1913:427). The red papery fruit capsule clusters and leaves of *Dodonaea* (*'a'ali'i*) were woven into flower *lei* (Pukui and Elbert 1986:3), and trunks were fashioned into house posts (Apple 1971:62; Buck 1957:83). It is an indigenous shrub or small tree that stands 2–8 m tall and ranges in distribution from coastal dunes to dry, mesic, and wet forest (Wagner et al. 1990:1227).

Four taxa found at Haleki'i and Pihana have known ritual uses. They include *Diospyros sandwicensis*, *Styphelia tameiameiae*, *Metrosideros polymorpha*, and *Syzygium malaccense*.

The indigenous *Styphelia* (*pūkiawe*) is most often seen as a spreading shrub but may be tree-like in upper elevations or dwarfed and trailing in bogs. It is present in various ecological niches from open low elevations to mountain wet forests and has been recorded from all of the main Hawaiian Islands except Ni'ihau and Kaho'olawe (Wagner et al. 1990:590–591). On Maui this species is known as *kāwa'u*. Smoke from burning *Styphelia* wood was used to cleanse and enable a high-ranking chief to mingle among common people without harm to either them or the chief (Neal 1965:663–664). The wood was also used to cremate the bodies of outlaws (Malo 1951:20; Neal 1965:663).

The remaining three taxa were used for constructing temple framing timbers and temple palisades that enclosed the sanctum, and for carving temple images. The genus *Metrosideros* (*'ōhi'a lehua*) is a hard wood used for temple idols, temple house posts, and temple palisades (Buck 1957; 'Ī'ī 1963:42–43; Kamakau 1961:2, 14, 200, 203, 210; Malo 1951:20, 151, 160–161, 173). It was also used for house rafters (Buck 1957:87) and manufacturing spears and bark cloth beating mallets (Neal 1965:638). *Metrosideros* is an abundant forest tree genus ranging in distribution from sea level to 2200 m in elevation (Wagner et al. 1990:964–970) and in habit from a low creeper in a bog environment to 30 m trees at mid-elevations (Neal 1965:637–638). The hard wood of *Diospyros* (*lama*) was also used to build temples and houses to cure the sick ('Ī'ī 1963:59–60; Pukui and Elbert 1986:192), enclosures for certain idols (Malo 1951:159), images (Apple 1971:62), and house rafters and chisel handles (Buck 1957:87). Hillebrand (1888:275) reported that the seeds were eaten by the natives. *Diospyros* was another principal wood for ritual use; its name means "enlightenment." Rock (1913:343–345) described this endemic Hawaiian species as a medium-sized tree that commonly inhabits dry as well as wet regions of all the Islands, although it is not as common as *Metrosideros*. The 2 m to 10 m tall trees have been found (between 5 and 1220 m elevations) on all Hawaiian Islands except Ni'ihau and Kaho'olawe (Wagner et al. 1990:585–587).

Syzygium (*'ōhi'a 'ai*) is believed to have been introduced into Hawai'i by the early Polynesian settlers. The 8- to 25-m trees can be found naturalized in low mesic to wet forests (Wagner et al. 1990:976). The trunks from these trees have been documented archaeologically to have been used as house posts (Weisler and Murakami 1991), but they were also used for house rafters, temple enclosures, and carved idols (Rock 1913:321; Wagner et al. 1990:976). The fruit was eaten, and the bark, flowers, and leaves were used medicinally (Neal 1965:636; Rock 1913:321–323). A dye for clothing was extracted from the bark (Brigham 1911; Buck 1957:187).

One taxon, an unidentified genus of fern (class Pteridophyta), was found only at Pihana and could have been used in either a domestic or ritual connotation (Neal 1965:6). Several genera of native ferns form large erect stems (caudex). The inner portion of the caudex is composed of a starchy pith that could be eaten after cooking by humans or eaten raw by pigs. The fine golden hair fibers from the caudex apex of the tree fern *Cibotium* (*hāpu'u*) were used as dressing for wounds as well as to embalm the dead (Neal 1965:10).

Eight taxa were common to both sites and may give us a clue as to the original coastal vegetation in the area surrounding Haleki'i and Pihana (see Table 3). These eight taxa include four dryland or coastal shrubs (*Chamaesyce*, *Dodonaea*, *Sida*, and *Styphelia*), as well as two dryland trees (*Diospyros* and *Myoporum*). The two mesic taxa common to both sites (*Cheirodendron* and *Ilex*) may have been collected from a forest not far inland from the coast, because the windward location of the sites might have provided adequate moisture to sustain a mesic forest. Approximately 70 percent of the assemblage weight common to both sites represents dryland species, although dryland as well as mesic taxa are equally repre-

TABLE 3. WOODY TAXA WEIGHT DISTRIBUTIONS BY Provenience

TAXA	HK*1*	HK*8*	HK*12*	HK*24*	HK*32*	PH*4*	PH*8*	PH*12*	PH*14*	PH*19*	TOTAL
A. koaia								2.4	0.3		2.7
Chamaesyce			0.4				3.1	0.4		0.8	4.7
Cheirodendron	0.7				1.7					1.1	3.5
Chenopodium									0.3	0.1	0.4
Diospyros		0.1		2.1						0.7	2.9
Dodonaea		0.3								0.4	0.7
Fern caudex										0.2	0.2
Ilex				0.2			4.6		0.3	0.1	5.2
Metrosideros	1.4			1.8							3.2
Myoporum	0.1		1.0			6.6				0.1	7.8
Sida			1.3	2.7					0.1		4.1
Sophora			0.2								0.2
Styphelia	0.1		0.4	0.2	8.2				1.0	0.1	10.0
Syzygium							1.5	1.3		0.7	3.5
Unknown A					0.5				0.2	0.7	1.4
Unknown B			0.1	0.6				0.7	0.1		1.5
Total	2.3	0.4	3.4	7.6	10.4	6.6	9.2	4.8	2.3	5.0	52.0

sented at both sites. This suggests that most of the firewood was probably collected from the area around the site.

Styphelia is the most abundant taxon by weight (10 g) as well as by spatial diversity (six features). It is interesting that *Styphelia* is absent from Pihana's three features used for ritual feasting, as well as from the small firepit on Haleki'i that had a possible function as a brazier or lamp. It is present, however, in the features considered to be domestic in function: the three firepits on Haleki'i and one hearth from each site used for food processing and/or artifact manufacturing. It is also present in Pihana 14, the bonfire of unknown function. Knowing that *Styphelia* was used for activities where chiefs and individuals of lesser status were likely to mingle, we can understand why it was present in all the domestic features, indicating that food and artifact preparation were regular activities where the high chiefs interacted with commoners. The habitat of *Styphelia* may have added to the precious state of the wood, because it may not have been available locally and was therefore more difficult to obtain. This might explain its co-occurrence with virtually all other taxa, perhaps used sparingly and in conjunction with other combustibles to obtain the required ritual effect. The presence of *Styphelia* in the bonfire of unknown function (Pihana 14), located within the sanctum of Pihana, suggests that this bonfire was affiliated with some sort of activity when commoners were allowed within the structure. The only known event when commoners were allowed to enter a war temple's sanctum was during periods of repair or modification of the site itself (Malo 1951:161). This in turn suggests that the other tree species found in Pihana 14, (*A. koaia* and *Ilex*) might also have been affiliated with construction of wood superstructures atop Pihana.

A number of differences also exist between the sample collected from Haleki'i and that from Pihana. *A. koaia*, *Chenopodium*, *Syzygium*, and the fern genus were unique to Pihana, and *Metrosideros* and *Sophora* were unique to Haleki'i. All of these taxa were native forest trees that would have been locally available, except

Syzygium and *Sophora*. The current distribution suggests that these two taxa had to have been transported from the mesic forest located at higher elevations. Some of these taxa probably served multiple functions. For example, the bark of *Syzygium* may have been removed for dye extraction, the stout portions of branches or trunks used for temple construction, and any remaining wood tossed into the fire. The fern caudex may have been eaten or used to supply fibers for dressing wounds and embalming the dead. We know the paramount chief Kamehamehanui was laid in state at Pihana before being taken to his burial site c. 1760 (Kamakau 1961:82).

Most of the charcoal assemblage represents tree taxa. Eight of the 13 woody taxa identified were trees, which provided from 30 to 100 percent of the wood by weight in the firepits. The sample from one of the firepits from Haleki'i was composed of 89–100 percent *Styphelia*, a hard shrub wood. This is not surprising given that the occupants of Haleki'i and Pihana were of high status and would presumably have had the highest variety of taxa as well as the best wood available for their use. The use of such hard woods suggests that the fires were intended to burn for some time. This might also suggest that trees made up the major part of the dryland forest.

SPATIAL VARIATION IN CHARCOAL DISTRIBUTION

Besides these general observations, let us now examine spatial and temporal distribution of these taxa to better understand the cultural variability evident in wood use. Our research questions now become: Is there spatial or temporal variability in charcoal distribution between archaeological contexts? Is wood used in ritual contexts more prevalent in one site? By identifying distinct patterns of charcoal distribution, we can then begin to link specific wood types to particular cultural processes.

Variability between two samples was analyzed using Spearman's rank-order coefficient. This coefficient compares two paired samples that are ordinal ranked to determine the degree of similarity between rankings. The advantage of the Spearman's test, even though it loses information by converting continuous measures of abundance to ordinal ranks, is that it is a relatively rigorous nonparametric means of comparing the overall similarity of two ordinal rankings.

Two Spearman's rank-order comparisons were performed with the charcoal assemblage. The first comparison examines the distribution of charcoal taxa between Haleki'i and Pihana. We would expect that charcoal use would be different on Haleki'i, which served as a chiefly residence, compared with Pihana, which served as the most important war temple on Maui. Evidence already exists that *Styphelia* was used differentially between features used for domestic purposes and those used for ritual feasting. Table 4 provides the paired distribution of charcoal weights for each taxon between Haleki'i and Pihana. Raw weights have been standardized to the total weight recovered per 0.1 m^3 to facilitate comparison between sites. Ordinal ranks of each observation are given in parentheses, all ties being averaged. Computation of the Spearman's rank-order coefficient for all 16 taxa produces an r value of -0.14730, which is not statistically significant (Thomas 1976:Table A. 13), indicating that there is a small degree of negative correspondence between the two orderings. Upon closer ex-

TABLE 4. CHARCOAL WOOD TAXA ABUNDANCES (g/0.1 m^3) BY SITE (RANK ORDER OF TAXA ABUNDANCES ARE IN PARENTHESES)

TAXA	HALEKI'I	PIHANA	ROW TOTAL
A. koaia	0 (14.5)	5.6 (5)	5.6
Chamaesyce	1.1 (7.5)	11.0 (2)	12.1
Cheirodendron	3.0 (4)	1.1 (8.5)	4.1
Chenopodium	0 (14.5)	0.6 (11)	0.6
Diospyros	2.9 (5.5)	0.7 (10)	3.6
Dodonaea	0.3 (11.5)	0.4 (12)	0.7
Fern caudex	0 (13.5)	0.2 (13.5)	0.2
Ilex	0.3 (11.5)	14.7 (1)	15.0
Metrosideros	5.1 (3)	0 (15.5)	5.1
Myoporum	2.9 (5.5)	6.6 (4)	9.5
Sida	7.1 (2)	0.2 (13.5)	7.3
Sophora	0.5 (9.5)	0 (15.5)	0.5
Styphelia	9.7 (1)	2.1 (6)	11.8
Syzygium	0 (13.5)	8.0 (3)	8.0
Unknown A	0.5 (9.5)	1.1 (8.5)	1.6
Unknown B	1.1 (7.5)	1.7 (7)	2.8
Column total	34.5	54.0	88.5

Note: Spearman's rank correlation coefficient: $r_s = -0.14730$, $n = 16$, $P > 0.425$.

amination of these data we see that five taxa vary considerably in their ordinal rankings. *Metrosideros* and *Sida* are more abundant on Haleki'i, and *A. koaia*, *Ilex*, and *Syzygium* are more abundant on Pihana. *Chamaesyce*, *Sophora*, and *Styphelia* are more abundant on Haleki'i to a lesser degree. Figure 4A is a cumulative percentage graph of the top ten taxa in terms of abundance. This graph helps to visualize the different taxa distributions between sites, as well as highlights those taxa more abundant on one site rather than another.

The presence of *Metrosideros* wood from only the Haleki'i firepits suggests a number of interesting possibilities. First, it indicates that *Metrosideros* was used for burning despite its primary use for carving temple images and the construction of houses affiliated with war temples (Malo 1951:152, 160–161). Although the ethnohistoric literature is silent about the burning of *Metrosideros*, its presence in the Haleki'i firepits suggests that the shavings and discarded portions from carved images were used to fuel fires or perhaps even ritually burned. This corroborates archaeological evidence that craft specialists practiced their trade on the site. Such individuals would have been retained on a permanent basis by high chiefs, who probably manufactured wooden idols and other prestige goods directly on site, perhaps using excess wood as combustibles. It is interesting that two large wooden god images were recovered in the agricultural fields below Haleki'i around the turn of the century. Wood samples analyzed from each of these images indicate that both were carved of *Metrosideros* (Adrienne Kaeppler, pers. comm., 1990). These images presumably were toppled into the fields after the abolition of the system of religious sanctions and preserved in the wetland sediments below. The procurement and carving of logs for the principal temple images followed strict religious sanctions, death being a common sentence to any unauthorized viewer (Haleole 1919:80, 82; 'Ī'ī 1963:43; Kamakau 1964:97;

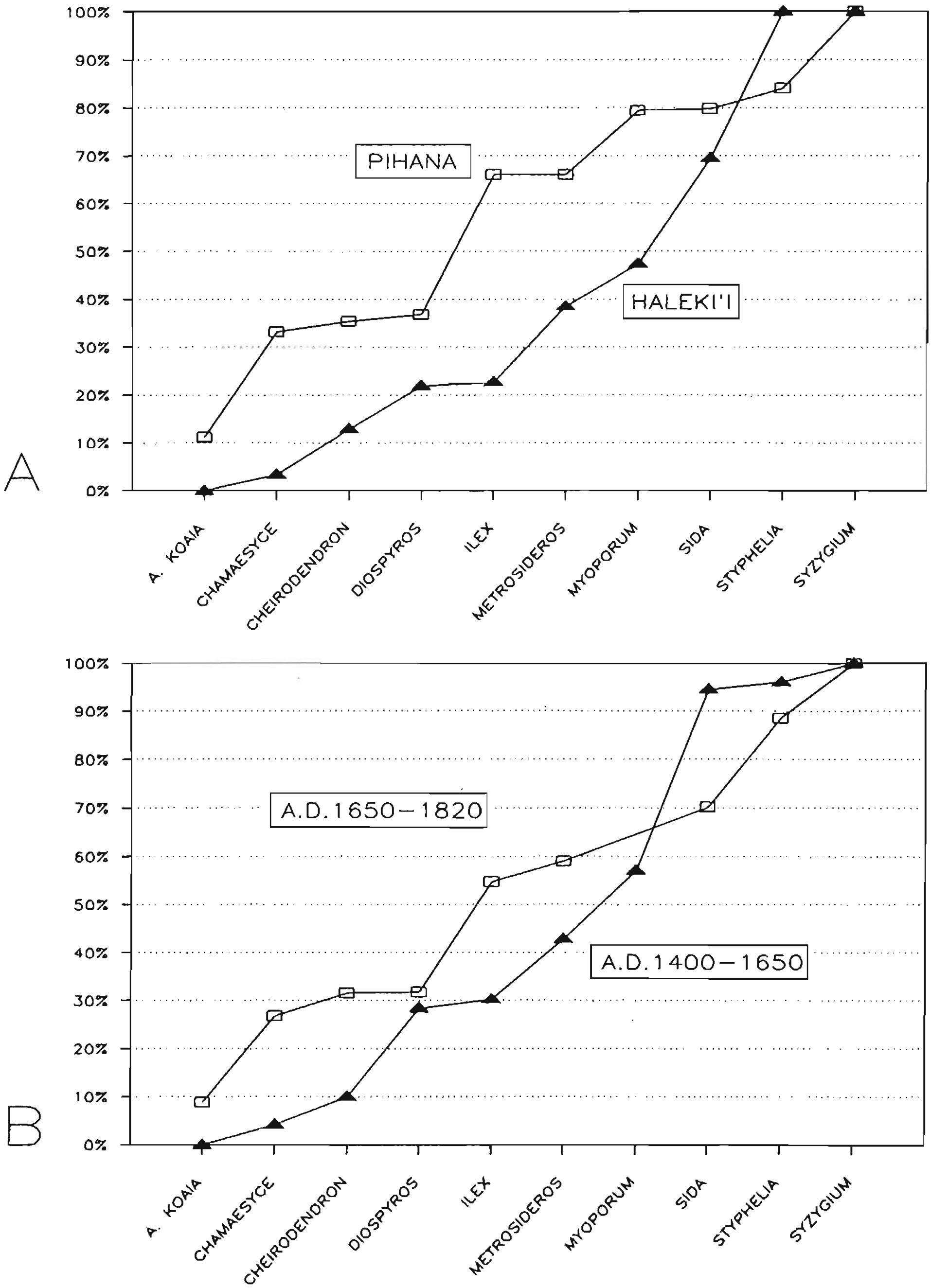

Fig. 4. Cumulative percentage graphs of relative charcoal richness for the ten most abundant taxa: A, the charcoal assemblage broken down by site; B, the charcoal assemblage broken down by time period. Percentages are raw weights adjusted to the total weight recovered per 10,000 cm^3 (0.1 m^3).

Malo 1951:166). Logs were always procured from inland forests of the same community in which the temple was built and were never obtained or transported between communities (Haleole 1919:80, 82). The lack of *Metrosideros* charcoal from Pihana is somewhat surprising, given Pihana's function as a war temple. It could be that the god images for Pihana were carved at Haleki'i before being installed within the sanctum at Pihana. It is interesting to note that the sacred *Metrosideros* wood in two domestic firepits on Haleki'i co-occurs with the *Styphelia* wood used to neutralize religious sanctions for commoners. Other woods used for carving images were *Diospyros* and *Syzygium*.

The high abundance of *Sida* on Haleki'i can be explained by the fact that Haleki'i served primarily as a high-status residence. *Sida* is a prolific and versatile plant, traditionally grown around residences and serving a variety of domestic uses. The primary presence of *Sida* on Haleki'i corroborates excavation results that revealed the presence of a high number of residential features including house foundation, pavements, earth ovens, manufacturing debris, and domestic midden (Kolb 1991:495). The presence of *Sida*, as well as the presence of *Metrosideros* to a lesser degree, stresses the multifunctional role of Haleki'i as a high-status residence that routinely incorporated a variety of domestic and craft activities. Such an important site, however, also included ritual activities as well, as evidenced by the presence of *Styphelia*, presumably associated with sacred areas such as family shrines or involved with chiefly feasting.

The exclusive presence of *A. koaia* and *Syzygium* on Pihana may suggest that they both had a more important ritual use than ethnohistoric evidence suggests. *A. koaia* was found only in two of the bonfires at Pihana, one used for ritual feasting (Pihana 12) and one of unknown function (Pihana 14). *Syzygium* was also found in two features used for ritual feasting (Pihana 8 and Pihana 12) and also in Pihana 19, the hearth area affiliated with domestic use and artifact manufacturing. The high level of abundance of *Ilex* is somewhat more difficult to explain, given that its use was primarily for the manufacturing of canoes. It is possible, however, that other uses existed about which nothing was documented in the ethnohistoric literature. It is interesting that both *Ilex* and *Syzygium* are mesic forest taxa. It could be that mesic woods were more valued because of their procurement costs or because of their size and relative hardness, meaning that they were preferred woods for constructing houses, fences, and carving images.

TEMPORAL VARIATION IN CHARCOAL DISTRIBUTION

Spearman's rank-order coefficient can also be used to compare the distribution of charcoal taxa between time periods because the charcoal assemblage can be divided into two separate samples based on age. Three firepits, two from Haleki'i and one from Pihana, date to an earlier period of occupation, c. A.D. 1400–1650. The remaining eight firepits cluster to the last period of occupation of both temples, c. A.D. 1650–1820. Table 5 provides the paired distribution of charcoal weights for each taxon between time periods. Again, raw weights have been standardized to the total weight recovered per 0.1 m^3 to facilitate comparison between sites. Ordinal ranks of each observation are given in parentheses, all ties being averaged. Computation of the Spearman's rank-order coefficient for all 16 taxa produces an E value of -0.0738, which is not statistically significant

TABLE 5. CHARCOAL WOOD TAXA ABUNDANCES (g/0.1 m^3) BY TIME PERIOD (RANK ORDER OF TAXA ABUNDANCES ARE IN PARENTHESES)

TAXA	A.D. 1400–1650		A.D. 1650–1820		ROW TOTAL
A. koaia	0	(15.5)	5.6	(6)	5.6
Chamaesyce	0.8	(6.5)	11.3	(3)	12.1
Cheirodendron	1.1	(5)	3.0	(7)	4.1
Chenopodium	0.0	(15.5)	0.6	(11)	0.6
Diospyros	3.5	(2)	0.1	(14)	3.6
Dodonaea	0.4	(11.5)	0.3	(12)	0.7
Fern caudex	0.2	(14)	0	(15.5)	0.2
Ilex	0.4	(11.5)	14.6	(1)	15.0
Metrosideros	2.4	(4)	2.7	(8)	5.1
Myoporum	2.7	(3)	6.8	(5)	9.5
Sida	7.1	(1)	0.2	(13)	7.3
Sophora	0.5	(10)	0	(15.5)	0.5
Styphelia	0.3	(13)	11.6	(2)	11.8
Syzygium	0.7	(8.5)	7.3	(4)	8.0
Unknown A	0.7	(8.5)	0.9	(10)	1.6
Unknown B	0.8	(6.5)	1.9	(9)	2.8
Column total	21.6		66.9		88.5

Note: Spearman's rank correlation coefficient: $r_s = -0.0738$, $n = 16$, $P > 0.425$.

(Thomas 1976: Table A. 13), indicating that there is an even smaller degree of negative correspondence between the two orderings than that produced by the comparison between sites. Upon closer examination of these data we see that five taxa vary considerably in their ordinal rankings. *Diospyros* and *Sida* are more abundant c. A.D. 1400–1650, and *A. koaia*, *Ilex*, and *Styphelia* are more abundant c. A.D. 1650–1820. Figure 4B is a cumulative percentage graph that illustrates the differences between taxa distributions through time.

It is possible that the temporal changes in wood use may be indicative only of changes on Haleki'i; the charcoal assemblage is relatively mute regarding changes in wood use on Pihana. This is because Pihana is represented by only a single feature (Pihana 19) dating to c. A.D. 1400–1650, but Haleki'i is represented by two features (Haleki'i 12 and Haleki'i 24). However, we can argue that the wood charcoal identified from Pihana 19 alone adequately represents wood use on Pihana c. A.D. 1400–1650 because more wood taxa were identified from Pihana 19 than from any other feature. Pihana 19 is represented by 11 wood taxa (Tables 1 and 2), four more than the feature ranked second in terms of richness (Pihana 14). Moreover, the number of separate taxa identified in Pihana 19 is more than the combined number of taxa identified in the two early features of Haleki'i (Table 2).

On the issue of relative site representation, we can argue that two plausible explanations exist for the variation in taxa abundance through time. It could be the result of environmental changes such as habitat depletion or it could represent change in the cultural contexts of the use of these woods. An environmental explanation of the change in wood use through time is difficult to apply given that the charcoal assemblage represents only two coastal sites. It is possible, however, that the lack of *Sida* and perhaps *Diospyros* in the more recent firepits is a result of habitat depletion through time. The depletion of *Sida*, however, is highly improbable given that it is a hardy dryland shrub. *Diospyros*, however, was not as prolific as other dryland trees, and its depletion in the vicinity of Hakeki'i and Pihana may have occurred earlier than that of other dryland trees.

An alternative explanation is to view variation through time in the traditional uses of these woods. The temporal distribution of *A. koaia*, *Sida*, and *Ilex* is consonant with their spatial distribution between sites, suggesting that the functional difference between Haleki'i and Pihana is temporally significant; that is, the ritual significance of Haleki'i and perhaps Pihana increased through time. This corroborates other archeological evidence that has shown that both temples increased in size and relative political importance by the time of Contact (Kolb 1991:304–309, 1992, 1994b). Pihana originally served as an open court temple and a chiefly residence before c. A.D. 1650–1820. It was converted to a war temple c. 1500 and was not expanded to its present size until c. A.D. 1650–1820. The complete lack of *Sida* from Pihana 19, although present in both Haleki'i 12 and Haleki'i 24, indicates that Pihana already may have been a ritually important site by A.D. 1500. Haleki'i, in contrast, was a smaller chiefly residence c. A.D. 1400–1650, but reached its apex in size and political importance after c. A.D. 1650.

The two taxa that do not vary considerably in their spatial ordinal rankings, but do vary significantly in their temporal ordinal rankings also indicate a relative rise in the ritual importance of both sites. *Diospyros*, prevalent c. A.D. 1400–1650 but almost completely lacking c. A.D. 1650–1820, was present in the earlier manufacturing hearth of Haleki'i (Haleki'i 24) and to a lesser degree in the earlier manufacturing hearth of Pihana (Pihana 19), but is represented in only one of the later features from both sites (Haleki'i 8). One important ritual use of *Diospyros* was for constructing ritual houses affiliated with Hale o Lono temples ('Ī'ī 1963:59–60; Malo 1951:160). *Metrosideros*, on the other hand, was used to construct the more politically and ritually important war temples. The high abundance of *Diospyros* c. 1400–1650 gives merit to the notion that Haleki'i and perhaps Pihana served as less ritually important temples before they became a primary political center by the time of Contact.

The relatively high abundance of *Styphelia* c. 1650–1820 corroborates that there was a relative increase in the level of sacredness of Haleki'i. The burning of *Styphelia* wood eased certain class sanctions and allowed interaction between chiefs and commoners without social or ritual retribution. Thus, Haleki'i would have had more frequent interaction between chiefs and commoners. The increased use of the mesic wood *Ilex* through time also supports the notion that more rare woods were being used on Pihana.

CONCLUSION

Although these data represent a relatively small sample of wood charcoal from only two religious sites, they highlight the potential of wood charcoal identification to help elucidate the interaction between the natural and cultural environments and the social role of woods in ritual contexts. In general, the charcoal indicates that the firewood was collected from the nearby dryland forest and that no one taxon appeared to have been favored. Most of the firewood was derived from tree species that must have been a major part of the forest and may suggest that the fires were intended to burn for some time.

Woods are shown to have undergone a number of significant cultural transformations. Although none of the woods at Halekiʻi or Pihana were domesticated, *Syzygium* has particular cultural significance, being a Polynesian introduction as well as a mesic forest tree. Its presence in the Pihana firepits indicates *Syzygium*'s active propagation and possibly the tending of other Polynesian-introduced woods not identified in the charcoal assemblage. For example, wood from two other actively cultivated Polynesian introductions, *Aleurites moluccana* (*kukui* or candlenut) and *Artocarpus altilis* (*ʻulu* or breadfruit), was absent from both sites even though these taxa have been a component in charcoal assemblages from other domestic firepits (Murakami 1990, 1991; Murakami et al. 1992). Their absence from these sites may be because their soft wood may not have survived combustion, or they were less prevalent in high-status contexts, or they were not actively exploited. Shell fragments from the nut of *Aleurites* were recovered from Halekiʻi 8, however. Nuts were exploited for oil, used as a preservative, or used as fuel for lamps.

Evidence also exists that woods were transformed into culturally significant items through physical alteration and processing. A number of woods recovered from Halekiʻi and Pihana had distinct ritual importance. The carving of *Diospyros*, *Metrosideros*, and *Syzygium* logs transformed them into god images that were highly valued religious items. *Metrosideros* had particular social value because its survival and growth were protected by religious sanction and its production was reserved and regulated for the convenience of the chiefs. The exclusive presence of *Syzygium* and *A. koaia* on the war temple of Pihana suggests that both woods had more of a ritual importance than is historically documented and may also have been under strict taboos for elite production and use. *Syzygium* was used for carving images, and *A. koaia* is a hard wood closely related to a tree used for the same purpose. The presence of *Styphelia* documents another cultural pathway where a wood was imbued with ritual significance upon its consumption by fire. The vapors of *Styphelia* eased certain class sanctions and mitigated potential ritual transgressions through the interaction of chiefs and commoners. The mesic tree *Ilex* is another taxon that could have been intentionally selected for burning and may have had particular cultural significance that we are unaware of historically.

The charcoal assemblage from Halekiʻi and Pihana is a test case that documents the potential for palaeoethnobotanical studies to address issues of cultural dynamics. Although primarily used in palaeoenvironmental reconstruction, we argue that wood charcoal actively reflects cultural choices related to domestic practices, ideology and ritualization, and social relationships. Variation in wood use demonstrates how a society's biological environment and ecological landscape can be imbued with cultural meanings relating to elite political and ritual strategies. As a class of palaeoethnobotanical data, woods have the potential for tracking important shifts in cultural change and inform archaeologists about past social and political systems.

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ABSTRACT

Although primarily used for palaeoenvironmental reconstruction, wood charcoal identification is ideal for the study of cultural dynamics if viewed as a class of material culture that actively reflects choices concerning domestic practices, ideology and ritualization, and political relationships. Archaeological evidence of ritual wood use from two temples in pre-Contact Hawai'i, supplemented with ethnohistoric data about traditional wood use, provides a test case that uses of woods underwent significant social transformations between A.D. 1400–1820. Variation in wood use from these two sites demonstrates how the biological environment can be imbued with cultural meanings, meanings that in turn illuminate how elite political and ritual strategies interact with a society's biological environment and ecological landscape. We propose that as a class of palaeoethnobotanical data, woods can be imbued with significant cultural value that can be used to track important shifts in cultural change and inform archaeologists about past social and political systems. Keywords: palaeoethnobotany, charcoal identification, ideology, complex societies, Hawai'i, monumental architecture.